

**FROZEN ALCOHOLIC BEVERAGES**

The present invention relates to frozen alcoholic beverages and processes for their preparation, in particular frozen alcoholic cocktails which can be used in hotels, pubs, night clubs, discos or other licensed venues.

5 It is difficult to freeze alcohol and produce a crystalline product. When alcohol is frozen either with or without a mixer, a non-crystalline gum is obtained. It is also desirable that such a product, upon being removed from cold storage to ambient temperature during consumption (eg. in normal use), does not quickly dissociate into its component parts. There is also a problem with packaging  
10 alcoholic products as the alcohol has a tendency to degrade most packaging materials.

An existing alcoholic product which is in a non-liquid form is a product known as "Jellignite". This product is in the form of a jelly which is prepared by mixing jelly crystals with alcohol.

15 Accordingly, investigations were carried out into the manufacture of an alcoholic beverage which can be frozen to a crystalline form.

In one aspect of the present invention there is provided a freezable alcoholic beverage comprising alcohol, mixer and a stabiliser. Preferably the beverage has a crystalline structure when frozen and the mixer consists  
20 essentially of water.

Preferably the alcohol is selected from a group including wine, spirits or liqueurs. The alcohol may include wine, spirits or liqueurs. Suitable wines include red wine, white wine and champagne. Examples of spirits include whisky such as Scotch whisky, Irish whisky, Canadian whisky, bourbon, Tennessee whisky,  
25 American Blended whisky, Japanese whisky or Australian whisky, gin, vodka, tequila, brandy, rum and sake. Suitable liqueurs include fruit-based liqueurs, for example, advocaat, apricot brandy, blackberry brandy, blackberry liqueur, cherry brandy, cointreau, creme de banana, creme de cassis, creme de fraises, creme de framboises, curacao, drambuie, grand marnier, kirsch, maraschino, midori,  
30 parfait amour, peach brandy, sabra or southern comfort, herb-based liqueurs, for

example, benedictine, bitters, chartreuse, creme de menthe or kummel and plant and nut-based liqueurs, for example, amaretto, anisette, creme de cacao, galliano, goldwasser, kahlua, ouzo, pernod, sambuca or tia maria (many of which are Registered Trade Marks). Generally, each of these exists as an alcohol solution or emulsion.

The stabiliser is preferably selected so that when the beverage is frozen an edible ice or ice-cream product is formed which is pleasant to the mouth. It has been surprisingly found that suitable stabilisers include vegetable gums (or dextrans) such as those known as NP 3500 Guar Gum (vegetable gum INS no. 412) and NP 217LBG (derived from locust bean gum and known as vegetable gum INS no. 410) supplied by Germantown International Limited. Others which may be used include Mexpectin LC910 or RI461(Registered Trade Mark) and xanthan gum, for example, Keltrol GM (Registered Trade Mark).

Preferably the stabiliser is a dextrin or a mixture of dextrans. More preferably, the stabiliser is selected from the group of guar gum, locust bean gum and xanthan gum or a mixture of any of them. In particular, it is preferred that the stabiliser consists essentially of a mixture of locust bean gum, pectin and xanthan gum in the ratio of about 35:15:3. It is preferable to pre-mix sugar into the stabiliser to help dispense the gums evenly, such that the sugar-stabiliser composition is comprised of sugar:locust bean gum:pectin:xanthan gum in the ratio of about 47:35:15:3. This acts as a thickening agent, as well as a stabiliser and texture modifier.

The beverage may also desirably further include a mixer selected from the group of water, water-based mixers and dairy-based mixers, including milk, cream and yoghurt. The mixer may be water or dairy based. Suitable water based mixers include water *per se*, mineral water, soda water, tonic water, bitter lemon, dry ginger ale, cordial, soft drink such as cola, raspberry or lemonade and fruit or vegetable juices such as orange juice, pineapple juice, lime juice, lemon juice or tomato juice. Examples of dairy based mixers include milk, cream and yoghurt.

In one preferred form, the invention provides a beverage consisting

essentially of a stabiliser, alcohol, citric acid, water, sweetener and one or more additives selected from the group of preservatives, colourants, flavourants and sweeteners.

5 The invention also provides a method for preparing a freezable alcoholic beverage, including the step of mixing an alcohol-water solution and a stabiliser so that the stabiliser is dissolved in the alcohol-water solution and the beverage is then frozen. Preferably, the stabiliser consists essentially of a mixture of locus bean gum, pectin and xanthan gum in the ratio of about 35:15:3.

10 The method may also include the step of first dissolving sugar in water before adding in the alcohol-water solution and the stabiliser.

In a preferred form, there is a method for preparing a freezable alcoholic beverage, including the steps of:

- (a) dissolving sugar in warm water to form a sugar solution;
- 15 (b) preparing a solution of citric acid dissolved in water and mixing it into the sugar solution;
- (c) separately mixing a stabiliser evenly into hot water and allowing it to hydrate, before adding this mixture to the mixture of solutions of step (b);
- 20 (d) subsequently adding an alcohol solution or emulsion to the mixture of solutions of step (c);
- (e) adding cold water to make up a predetermined volume.

Preferably, the method further includes after step (d) the step of adding one or more additives selected from the group of preservatives, colourants and flavourants. More preferably, a preservative is also added to the initial sugar-  
25 water solution before the addition of the citric acid. The preservative may be sodium benzoate.

It will be appreciated that one or more other known food additives such as colorants, flavourants, sweeteners, for example, citric acid, modified fats, air or emulsifying, gelling, thickening, anti-foaming or firming agents may be included in the beverage. In particular, the use of alcohol flavourants may be advantageous to  
 5 reduce the amount of alcohol present in the beverage and assist in the freezing process.

The beverage may also include fruit which can add colour, flavour and thickness. Suitable fruits for this purpose include apples, apricots, avocados, bananas, cherries, grapefruit, lemon, limes, mandarins, mangoes, melons,  
 10 oranges, passionfruit, peaches, pears, pineapples, raspberries and strawberries.

The mixing may be achieved by using any suitable known technique, such as, for example, agitation.

The beverage is advantageously stored in a package and frozen until the time of consumption. The package is preferably composed of a material which is  
 15 not substantially degraded, when the beverage is frozen or liquid, and impermeable to alcohol. Suitable materials include foil and plastic, for example, a nylon/polyethylene extrusion laminate (available from WR Grace Australia Ltd ACN 004 207 532 as product R0179).

Thus, the present invention also provides a frozen alcoholic product which  
 20 comprises a freezable alcoholic beverage as defined above contained in a package.

The term "package" is used herein in its broadest sense and includes any means for containing the beverage such as a parcel, film, container, box or bag. The package is generally sealed so as to prevent leakage of the contents, for  
 25 example, by vacuum or heat sealing. A preferred package is a sealed tube.

It will be appreciated that the frozen beverage may also be in the form of a confectionery product such as an ice-stick or ice-cream.

The invention will now be described with reference to the following Examples. These Examples are not to be construed as limiting the invention in any way.

Examples 1 to 5 exemplify one form of the invention. The alcohol contents of each of the formulations in Examples 1 to 5 are as in the following tables. Cheaper ingredients were substituted for the alcohol in two of the varieties, namely, melon liqueur and Wipe Out® for Midori® and Malibu®, respectively. The guar gum and locus bean gum were added to produce a product of acceptable texture which is sufficiently stable.

10 The total soluble solids content in degrees Brix as measured by a standard refractometer of the formulations in Examples 1 to 5 are also as set out in the attached tables.

The two gums are slowly added in powder form to approximately half of the total amount of water required and mixed under agitation at an ambient temperature. Once the gums have dissolved into the water, the gum and water mixture is left to stand for a period of at least fifteen minutes. This allows the gums to hydrate before adding any of the other components. The alcohol component is then added together with the flavouring (if any). The remaining components and the remainder of the water are then added and the mixture stirred gently for five minutes to ensure complete and consistent mixing.

The formulation is then subjected to a brix reading which should be about 15°. The mixture is then packed into tubes as described above, heat sealed and frozen up to the time of consumption. Tubes of a 35ml volume have been found convenient.

25 Freezing stability was assessed by aiming to detect organoleptic changes in textural qualities between samples frozen for several weeks and samples thawed and refrozen repeatedly over that time. No textural changes were detected.

It is considered that a temperature of about -15°C (as found in a typical refrigerator freezer box) is desirable for freezing and storing the ice-stick product.

**Example 1 - Formulation for Vodka and Orange Frozen Alcoholic Ice Confection**

| COMPONENT                        | SPECIFICATION                  | SUPPLIER                    | PERCENTAGE %<br>(by weight) |
|----------------------------------|--------------------------------|-----------------------------|-----------------------------|
| Vodka                            | 37% alc/vol, 14° brix          | Karloff (brand)             | 16.2                        |
| Vodka<br>flavouring<br>(natural) | code: 9/A03731C                | Dragoco Australia           | 0.8 to 1%                   |
| Orange fruit<br>juice cordial    | 33° brix                       | Home Brand<br>(supermarket) | 38.6                        |
| Locust bean<br>gum               | code: LOCGUM06                 | Scalzo Food<br>Industries   | 0.06                        |
| Guar gum                         | FGF-1 (very fast<br>hydration) | Henkel                      | 0.04                        |
| Water                            |                                |                             | 44.3                        |

5 **Example 2 - Formulation for Vodka and Raspberry Frozen Alcoholic Ice Confection**

| COMPONENT                         | SPECIFICATION                  | SUPPLIER                  | PERCENTAGE %<br>(by weight) |
|-----------------------------------|--------------------------------|---------------------------|-----------------------------|
| Vodka                             | 37% alc/vol, 14° brix          | Karloff (brand)           | 16.2                        |
| Vodka<br>flavouring<br>(natural)  | code: 9/A03731C                | Dragoco Australia         | 0.8                         |
| Raspberry<br>flavoured<br>cordial | 29° brix                       | Savings<br>(supermarket)  | 43.9                        |
| Locust bean<br>gum                | code: LOCGUM06                 | Scalzo Food<br>Industries | 0.06                        |
| Guar gum                          | FGF-1 (very fast<br>hydration) | Henkel                    | 0.04                        |
| Water                             |                                |                           | 39.0                        |

**Example 3 - Formulation for Scotch and Cola Frozen Alcoholic Ice Confection**

| COMPONENT                   | SPECIFICATION               | SUPPLIER               | PERCENTAGE %<br>(by weight) |
|-----------------------------|-----------------------------|------------------------|-----------------------------|
| Scotch Whisky               | 37% alc/vol, 14.5° brix     | Carlton Club (brand)   | 16.2                        |
| Whisky flavouring (natural) | code: 6/059075              | Dragoco Australia      | 0.4 to 0.5 or 0.6           |
| Cola flavoured cordial      | 42° brix                    | KiaOra (supermarket)   | 30.1                        |
| Locust bean gum             | code: LOCGUM06              | Scalzo Food Industries | 0.06                        |
| Guar gum                    | FGF-1 (very fast hydration) | Henkel                 | 0.04                        |
| Water                       |                             |                        | 53.2                        |

**Example 4 - Formulation for Malibu and Pineapple Frozen Alcoholic Ice Confection**

| COMPONENT                            | SPECIFICATION   | SUPPLIER                    | PERCENTAGE %<br>(by weight) |
|--------------------------------------|---|-----------------------------|-----------------------------|
| Wipeout                              | 21% alc/vol, 26° brix                                     | Grunters (brand)            | 28.6                        |
| Coconut rum and pineapple flavouring | Rum flavouring 9/A04891 and pineapple flavouring 9/693148 | Dragoco Australia           | 0.4 to 0.6                  |
| Pineapple crush fruit juice cordial  | 43.5°   | Golden Circle (supermarket) | 17.1                        |
| Locust bean gum                      | code: LOCGUM06  | Scalzo Food Industries      | 0.06                        |
| Guar gum                             | FGF-1 (very fast hydration)                               | Henkel                      | 0.04                        |
| Water                                |   |                             | 53.6 to 53.8                |

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N.B: No flavouring is added to the product in this example.

**Example 5 - Formulation for Midori and Lemonade Frozen Alcoholic Ice Confection**

| COMPONENT                | SPECIFICATION               | SUPPLIER               | PERCENTAGE %<br>(by weight) |
|--------------------------|-----------------------------|------------------------|-----------------------------|
| Melon liqueur            | 22.9% alc/vol, 38° brix     | Seagram's (brand)      | 26.2                        |
| Melon flavouring (N.I.)  | code: 6/062830              | Dragoco Australia      | 0.4 to 0.6                  |
| Lemonade soft drink base | 58.5° brix                  | Schweppes              | 8.6                         |
| Locust bean gum          | code: LOCGUM06              | Scalzo Food Industries | 0.06                        |
| Guar gum                 | FGF-1 (very fast hydration) | Henkel                 | 0.04                        |
| Water                    |                             |                        | 64.7                        |

It will be apparent to one skilled in the art that other flavourings could be used in further formulations of a freezable alcoholic beverage according to the invention. Other formulations of the invention could include a flavouring or drink base which is a dairy product.

Each of these products has 15° brix and 6% alcohol in the final product, and will remain frozen at -15°C.

In Examples 6 to 11, another aspect of the invention is described being an industrially applicable method of manufacturing a freezable alcoholic beverage.

The beverage produced by each of these examples has a brix reading of 14.5° and an alcoholic content of 6.5% w/v. The brix reading is the product largely of the dissolved sugar (both added sugar and sugar from wine). The acid content varies from 0.2 to 0.3% w/v Anhydrous Citric Acid ("ACA"). The acid reading is specified in each example.

The examples are all made by the following method to manufacture 1000 litre batches. The components are added in the amounts specified in the table in each of the examples.

To manufacture the freezable alcoholic beverage of this aspect of the invention, the sugar (except for a small proportion equivalent to about 4 times the



weight of the stabiliser being used) is dissolved in a minimal quantity of warm water (generally 4 to 5 times the amount by weight of the sugar is sufficient at a temperature of 40 to 50°C). While an increased temperature will facilitate dissolving of the sugar, it is desirable that the temperature of the overall mixture not be too high in later steps so as to minimise the loss of flavouring vapours and the like (eg, from wine). Alternatively, liquid sugar syrup (of a given brix level) may be used with a comparable equivalent level of sugar to the amount specified in each table. The sodium benzoate, (a known preservative, INS no. 211) is dissolved in a separate amount of hot water before being added to the main tank containing the sugar dissolved in water. All contents are then mixed well. The citric acid is then also dissolved separately in hot water and again added to the main tank, after the sodium benzoate.

The component identified as the “stabiliser” in each table is pre-formulated in bulk prior to this process. This stabiliser is dry blended with the withheld proportion of the sugar being about 4 times the weight of the stabiliser. The dry blending occurs with a sugar:stabiliser ratio of about 4:1. The dry blended mixture is then slowly added to a separate tank of hot water (sufficient water to make a 1 to 2% solution, eg 150 to 250 litres is used) with good agitation and allowed to hydrate for 30 minutes. It is important that this solution does not have any visible gum lumps or spots. The stabiliser solution is then added to the main tank and mixed well. Next, the wine is added and mixed well into the main tank. Finally, colours and flavours are added to the main tank and mixed well. Cold water is then added to make up the volume to 1000 litres, again with good mixing.

For health reasons, it may be desirable to pasteurise the product before dispensing it into individual packaging. Wild yeast may be introduced from the sugar or wine, or possibly other components. Pasteurisation, and the methods of achieving it, are known to one skilled in the art.

The components for Examples 6 to 11 are set out in the following tables. In the following tables, abbreviations are used as follows:

• Ni - nature identical

- FI - flavour
- Pmx - premix
- Col - colour
- Pwd - powder

- 5
- BBAA - Bush Boake Allen Australia Ltd ACN 004 269 658 of 310 Dandenong Valley Highway, Dandenong, Victoria, 3175, Australia

Further, the numerical codes adjacent to components is a product number for the supplier listed in the supplier column. Where no supplier is listed, the product is widely commercially available.

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- The component identified as "56-4458 water ice stabiliser" is a mixture of sugar (47%) and vegetable gums, namely locust bean (carob bean) gum (INS no. 410) 35%, pectin (INS no. 440(a)) 15% and xanthan gum (INS no. 415) 3% (percentages being by weight).

**Example 6 - Formulation for Bourbon and Cola Frozen Alcoholic Ice Confection**

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*Acid - 0.2% w/v ACA*

| COMPONENT                        | SUPPLIER  | PERCENTAGE %<br>(by weight)         |
|----------------------------------|-----------|-------------------------------------|
| Sugar                            |           | 130.00 kg                           |
| Sodium Benzoate                  |           | 0.47 kg                             |
| Citric Acid Anhydrous            |           | 1.00 kg                             |
| 56-4458 water ice stabiliser     | BBAA      | 2.50 kg                             |
| Wine (22%)                       | Southcorp | 296.00 litres                       |
| 11-3502 Citraroma Cola FI<br>Pmx | BBAA      | 2.00 litres                         |
| 11-1528 Ni Whisky FI             | BBAA      | 0.70 litres                         |
| Water                            |           | To make total volume of 1000 litres |

**Example 7 - Formulation for Melon and Lemon Frozen Alcoholic Ice Confection***Acid - 0.2% w/v ACA*

| COMPONENT                    | SUPPLIER  | PERCENTAGE %<br>(by weight)         |
|------------------------------|-----------|-------------------------------------|
| Sugar                        |           | 130.00 kg                           |
| Sodium Benzoate              |           | 0.47 kg                             |
| Citric Acid Anhydrous        |           | 1.00 kg                             |
| 56-4458 water ice stabiliser | BBAA      | 2.50 kg                             |
| Wine (22%)                   | Southcorp | 296.00 litres                       |
| 06-0404 Natural Sol Lemon FI | BBAA      | 1.50 litres                         |
| 05-5000Ni Melon FI           | BBAA      | 0.12 litres                         |
| Brilliant Blue Col Pwd       |           | 0.0005 kg                           |
| Tartrazine Col Pwd           |           | 0.01 kg                             |
| Water                        |           | To make total volume of 1000 litres |

**Example 8 - Formulation for Rum Pine and Coconut Frozen Alcoholic Ice Confection**

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*Acid: 0.2% w/v ACA*

| COMPONENT                    | SUPPLIER  | PERCENTAGE %<br>(by weight)         |
|------------------------------|-----------|-------------------------------------|
| Sugar                        |           | 130.00 kg                           |
| Sodium Benzoate              |           | 0.47 kg                             |
| Citric Acid Anhydrous        |           | 1.25 kg                             |
| 56-4458 water ice stabiliser | BBAA      | 2.50 kg                             |
| Wine (22%)                   | Southcorp | 296.00 litres                       |
| 07-8678 Ni Pineapple FI      | BBAA      | 1.00 litres                         |
| 08-9557Rum FI                | BBAA      | 1.50 litres                         |
| 03-4296 Ni Coconut FI        | BBAA      | 0.05 litres                         |
| Tartrazine Col Pwd           |           | 0.01 kg                             |
| Water                        |           | To make total volume of 1000 litres |

**Example 9 - Formulation for Vodka Lemon Lime Frozen Alcoholic Ice Confection**

Acid: 0.3% w/v ACA

| COMPONENT                    | SUPPLIER  | PERCENTAGE %<br>(by weight)         |
|------------------------------|-----------|-------------------------------------|
| Sugar                        |           | 130.00 kg                           |
| Sodium Benzoate              |           | 0.47 kg                             |
| Citric Acid Anhydrous        |           | 2.00 kg                             |
| 56-4458 water ice stabiliser | BBAA      | 2.50 kg                             |
| Wine (22%)                   | Southcorp | 296.00 litres                       |
| 05-9006 Natural Sol Lemon FI | BBAA      | 4.00 litres                         |
| Water                        |           | To make total volume of 1000 litres |

**Example 10 - Formulation for Vodka & Orange Frozen Alcoholic Ice Confection**

Acid: 0.2% w/v ACA

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| COMPONENT                     | SUPPLIER  | PERCENTAGE %<br>(by weight)         |
|-------------------------------|-----------|-------------------------------------|
| Sugar                         |           | 130.00 kg                           |
| Sodium Benzoate               |           | 0.47 kg                             |
| Citric Acid Anhydrous         |           | 1.00 kg                             |
| 56-4458 water ice stabiliser  | BBAA      | 2.50 kg                             |
| Wine (22%)                    | Southcorp | 296.00 litres                       |
| 07-2241 Natural Sol Orange FI | BBAA      | 3.00 litres                         |
| Sunset Yellow Col Pwd         |           | 0.10 kg                             |
| Water                         |           | To make total volume of 1000 litres |

**Example 11 - Formulation for Vodka & Raspberry Frozen Alcoholic Ice Confection***Acid: 0.2% w/v ACA*

| COMPONENT                        | SUPPLIER  | PERCENTAGE %<br>(by weight)         |
|----------------------------------|-----------|-------------------------------------|
| Sugar                            |           | 130.00 kg                           |
| Sodium Benzoate                  |           | 0.47 kg                             |
| Citric Acid Anhydrous            |           | 1.00 kg                             |
| 56-4458 water ice stabiliser     | BBAA      | 2.50 kg                             |
| Wine (22%)                       | Southcorp | 296.00 litres                       |
| 08-4246 Ni Raspberry Fl<br>No. 1 | BBAA      | 4.00 litres                         |
| 22-1762 Caramel Colour<br>'N'    | BBAA      | 0.20 kg                             |
| Ponceau Col Pwd                  |           | 0.03 kg                             |
| Water                            |           | To make total volume of 1000 litres |

After the manufacturing process described above, the end product is, at  
5 room temperature, a relatively non-viscous liquid which is easily handled.  
Packages manufactured as described above, such as in the form of a tube closed  
at one end can then be filled from the main tank containing the mixture. Once  
filled, the open end of the tube may be closed, for example by heat sealing. The  
entire package may then be frozen, and kept in that form until opened by a  
10 consumer for immediate consumption.

It will also be understood that the term "comprises" or its grammatical  
variants as used herein is equivalent to the term "includes" and is not to be taken  
as excluding the presence of other elements or features.

It will be understood that the invention disclosed and defined herein  
15 extends to all alternative combinations of two or more of the individual features  
mentioned or evident from the text. All of these different combinations constitute  
various alternative aspects of the invention.